

NON-PUBLIC?: N  
ACCESSION #: 8908080199  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Washington Nuclear Plant - Unit 2 PAGE: 1 of 5

DOCKET NUMBER: 05000397

TITLE: Turbine Throttle Valve Closure Reactor Scram During Turbine  
Testing Caused By Inadequate Procedure  
EVENT DATE: 06/29/89 LER #: 89-028-00 REPORT DATE: 07/27/89

OPERATING MODE: 1 POWER LEVEL: 025

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: William S. Davison, Compliance TELEPHONE: (509) 377-2501  
Engineer EXT. 2726

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

On June 29, 1989, at 0020 hours, during testing of the Main Turbine Overspeed Protection Controller (OPC), a Turbine Throttle Valve Closure Reactor Scram occurred. At the time of the scram, the turbine was operating in throttle valve control coasting down from the OPC actuation setpoint of 1854 RPM. After three unsuccessful attempts to input an 1800 RPM speed demand, the operator decided to wait until actual turbine speed had dropped below 1800 RPM to try again. After turbine speed dropped below 1800 RPM, the operator keyed in another 1800 RPM reference demand at 50 RPM per minute as specified in the procedure. This input was accepted by the turbine control system. The operator, as directed by the procedure, then returned turbine control to the "IN SERVICE" position with the OPC keylock switch. This resulted in rapid opening of the turbine governor and throttle valves and subsequent pressurization of the turbine first stage chamber. Since the throttle valves were less than 95% open at this point, this caused actuation of the turbine first stage pressure switches causing the scram logic to be met resulting in a turbine throttle valve closure reactor scram. The root cause of the

event was a less than adequate procedure in that the turbine operating procedure did not prevent the OPC test from being done with the turbine in the throttle valve control mode. Corrective actions taken consist of deviation of the operating procedure. The operator training program will be improved in this area. Since all safety systems operated as designed and the plant operators acted promptly to place the plant in a safe shutdown condition this vent posed no threat to the health or safety of plant personnel or the public.

END OF ABSTRACT

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#### Plant Conditions

- a) Power Level - 25%
- b) Plant Mode - 1 (Power Operation)

#### Event Description

On June 29, 1989, at 0020 hours, during testing of the Main Turbine Overspeed Protection Controller (OPC), a Turbine Throttle Valve Closure Reactor Scram occurred. This particular reactor scram signal is developed any time reactor power is greater than 30% (as indicated by turbine first stage pressure monitored by pressure switch contacts) and main turbine throttle valve position is less than 95% open. At the time of the scram, the turbine was coasting down from the OPC actuation setpoint of 1854 RPM. The OPC function of closing the governor and intercept valves at 103% turbine speed had just been successfully demonstrated and the turbine was in the process of being returned to normal operation. During this time, the throttle valves were opening in an attempt to maintain turbine speed at 1890 RPM, but the turbine continued to coast down because the OPC function held the governor and intercept valves closed. When the Control Room Operator attempted to set the Main Turbine Digital Electro-Hydraulic Control System (DEH) "Reference Demand" to 1800 RPM, as directed by the operating procedure, the system would not accept the request because the speed setpoint was still being incremented to the original 1890 RPM setpoint called for by the OPC test. After three unsuccessful attempts to input an 1800 RPM speed demand, the operator decided to wait until actual turbine speed had dropped below 1800 RPM to try again. After turbine speed dropped below 1800 RPM, the operator keyed in another 1800 RPM reference demand at 50 RPM per minute as specified in the procedure. This input was accepted by the turbine control system. The operator, as directed by the procedure, then returned turbine control to the "IN SERVICE" position with the OPC keylock switch. This resulted in rapid opening of the turbine governor valves and subsequent pressurization of the turbine first stage chamber to greater than 142 psig. Since the throttle valves

were less than 95% open at this point, this caused actuation of the first stage pressure switches causing the scram logic to be met resulting in a turbine throttle valve closure reactor scram.

Previous to the scram, when OPC testing was initiated, the turbine was not synchronized to the power grid and was being operated at 1800 RPM in the throttle valve speed control mode. Normally, the turbine would have been in the governor valve control mode at this speed. However, a previous test of turbine bypass valve response time ended with final restoration leaving the turbine in throttle valve control.

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Since there was no requirement for the turbine to be in governor valve control

listed in the procedure, the OPC test was initiated with the turbine remaining in throttle valve control. With the DEH System in the throttle valve control mode, the governor valves were being held in the full (100%) open position and the throttle valves were being used to control steam flow to the turbine first stage. If the DEH System had been in the governor valve control mode, the throttle valves would have been held in the full (100%) open position and the governor valves used to control steam flow to the turbine first stage. Thus, with the turbine in governor valve control, the throttle valves are held at greater than 95% open unless closed by a turbine trip signal which will then consequently result in a reactor scram.

In the interval between the OPC actuation at 1854 RPM and turbine coastdown to reach approximately 1720 RPM, the governor valves closed, the throttle valves opened in an attempt to control turbine speed, and the DEH control circuitry completed a "REFERENCE DEMAND" signal ramp up to 1890 RPM at 50 RPM per minute. This ramp up response by DEH control circuitry was in reply to the demand" initially keyed into the DEH control panel to initiate the turbine OPC test. After completion of this circuit ramp up, the DEH System was then ready to receive further input. When, on the fourth attempt, the operator supplied an 1800 RPM demand signal, DEH responded. Starting from the existing 1720 RPM actual turbine speed, the governor valves were driven fully open while the throttle valves repositioned to answer the DEH command at the ordered 50 RPM per minute acceleration rate. This resulted in the admission of sufficient steam to pressurize the first stage of the turbine to greater than the 142 psig setpoint of the turbine first stage pressure switches and cause the erroneous reactor power indication.

#### Immediate Corrective Action

Plant operators immediately responded to the reactor scram to maneuver the plant to a safe shutdown condition in accordance with plant procedures.

## Further Evaluation and Corrective Action

### A. Further Evaluation

1. This event is being reported per the requirements of 10CFR50.73(a)(2)(iv) as an event that resulted in the automatic actuation of an Engineered Safety Feature i.e., a Reactor Protective System actuation.

2. The root cause of this event was identified as being:

a) Procedure Less Than Adequate - The operating procedure for the main turbine did not specify as a limit that the turbine must be in governor valve control prior to performance of the OPC actuation. Sufficient information should have been given to allow the operators to determine that the turbine should have been in governor valve control to prevent the throttle valves from satisfying the less than 95% open RPS logic criteria for initiation of the throttle valve closure scram.

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3. A contributing factor to the occurrence of the event was identified as being:

a) Training Less Than Adequate - The OPC testing section of the turbine operating procedure is performed on an infrequent basis, once per year immediately after the annual outage. During the procedure, the turbine is operated above 1800 RPM in the OPC actuating range with the use of the OPC keylock switch. This is an unusual operating mode. The operator had never performed this test before and had not received specific training on this unusual evolution.

4. The DEH System accepted the 1800 RPM reference demand input on the fourth attempt by the operator, not because turbine speed was below 1800 RPM, but because it had then completed the original command to ramp up to 1890 RPM at 50 RPM per minute. In order to accept a new speed reference, any previously initiated demand must be satisfied or the "HOLD" feature must be used.

5. There were no systems, components or plant structures which were inoperable prior to the initiation of this event which affected the event.

6. During the initiation of this event, the Reactor Recirculation Pump End of Cycle Trip (EOC-RPT) system was actuated to trip only Reactor Recirculation Pump 1B (RRC-P-1B). Expected normal response from this system is the trip of both RRC-P-1A and RRC-P-1B. Subsequent testing of the EOC-RPT circuitry demonstrated that it was functioning correctly and that no failure was present. An evaluation of the calibration checks of the four pressure switches associated with the EOC-RPT circuit and the plant transient concluded that: (1) two of the four pressure switches were found to trip below the setpoint but within tolerance while two were found to trip above the setpoint but within tolerance; (2) the magnitude and duration of the transient were sufficient to actuate the two pressure switches which trip RRC-P-1B but not the two which trip RRC-P-1A. The final conclusion of the evaluation was that the EOC-RPT circuit functioned normally for the conditions imposed during the throttle valve closure scram.

#### B. Further Corrective Action

1. The Main Turbine Operating Procedure was modified to provide closer control of the OPC test and other overspeed functional tests and to specify running the test in the governor valve control mode.
2. The following will be included in the initial and continuing licensed training program:
  - a. Explanation of why the DEH would not accept the new 1800 RPM reference demand value until the fourth attempt by the operator.

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- b. Discussion of the new procedural requirement to perform the OPC test and other overspeed functional tests in governor valve control.
    - c. Job task analysis for performance of training on the OPC test function.
    - d. Discussion of the details of the event, its root causes and corrective actions.
  3. A task group will be formed to analyze the functioning of the DEH turbine control system in relation to the information contained in the turbine operating procedure. This effort will focus on

recommending improvements to the operating procedure and the licensed training program.

#### Safety Significance

Since reactor power was not in fact greater than 30% and no turbine trip condition occurred, no actual reactor scram initiating condition existed during the turbine OPC test. All protective systems responded as designed and the plant operators acted in accordance with approved procedures to place the plant in a safe shutdown condition in a controlled and timely manner. This event posed no threat to the health and safety of the public or plant personnel.

#### Similar Events

LER 84-054-00 documented an event of similar nature which involved the rapid cycling of the turbine control valves open and closed six times in a 30 second period during OPC testing resulting in a throttle valve closure reactor scram.

#### EIIS Information

##### Text Reference EIIS Reference

##### System Component

Main Turbine TA TRB  
Overspeed Protection Controller TA SC  
Turbine Throttle Valve TA V  
Turbine Governor Valve TA V  
Pressure Switch JC PS  
Intercept Valve TA V  
DEH JJ DCC  
Keylock Switch JJ HS  
Turbine Bypass Valve TA V  
RRC-P-1A AD P  
RRC-P-1B AD P

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 3000 George Washington Way Richland, Washington 99352

Docket No. 50-397

July 28, 1989

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: NUCLEAR PLANT NO. 2  
LICENSEE EVENT REPORT NO. 89-028

Dear Sir:

Transmitted herewith is Licensee Event Report No. 89-028 for the WNP-2 Plant. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence.

Very truly yours,

C.M. Powers (M/D 927M)  
WNP-2 Plant Manager

CMP:lg

Enclosure:  
Licensee Event Report No. 89-028

cc: Mr. John B. Martin, NRC - Region V  
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